

CLAIMS

1. A laser line beam emitting apparatus comprising:

5 a laser beam emitter for emitting a laser beam therefrom, the laser beam emitter having an optical broad element through which the emitted laser beam flux are vertically or horizontally broadened so that a vertical or horizontal straight line is formed and drawn on its objects, the broadened laser beam flux having a
10 central optical axis,

a main covering for surrounding and covering said laser beam emitter therewith, the main covering comprising a plurality of faces and having at least one longlength outlet consecutively formed on said faces which the vertically or horizontally broadened
15 laser beam flux reach, and

a plurality of dust protective coverings consecutively provided in said outlet of the main covering for preventing enterer of dust thereinto, the broadened laser beam flux being in part reflected from said dust protective covering, one of the dust
20 protective coverings being arranged in a position through which said central optical axis of the broadened laser beam flux passes, the dust protective covering at the passage of the central optical axis of the broadened laser beam flux having a curvature such that the reflected, emitted laser beam therefrom through the laser beam
25 emitter goes back into the interior of the apparatus.

2. The laser line beam emitting apparatus of claim 1, wherein said dust protective covering has an inner surface on which said curve is formed with recess.

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3. The laser line beam emitting apparatus of claim 1, wherein said dust protective covering with curvature is arranged at said face served as a ceiling of said main covering.

10 4. The laser line beam emitting apparatus of claim 1, wherein said dust protective covering with curvature is arranged at face served as a front of said main covering.

5. A laser line beam emitting apparatus comprising:

15 a main covering provided thereto, the main covering having at least a ceiling, a front, a back and sides;

a first outlet consecutively formed between said ceiling and the front nearer to said ceiling of the main covering,

20 a second outlet consecutively formed between said front and said sides of the main covering;

first and/or second laser beam emitting units provided in said main covering for emitting first and/or second laser beams therefrom, each of the first and second laser beam units having first and second emission elements in which respective cylindrical rod lenses are provided therein, the emitted laser beam having a central optical axis and beam flux, the beam flux of the emitted laser beams each being, after be collimated therein, broadened to two opposite directions approximately vertically or horizontally

broadening from the central optical axes through the cylindrical rod lens, the first unit being disposed behind of said first outlet so that the vertically broadened laser beam is transmitted through the first outlet for formation of a vertical reference line drawn on its objects, the second unit being disposed behind of said second outlet so that the horizontally broadened laser beam is transmitted through the second outlet for formation of a horizontal reference line drawn on its objects;

first and/or second dust protective covering members provided in said first and second outlets of the main covering, respectively and each having a reflecting surface formed on the inner surface thereof, the broadened, emitted laser beam flux from respective first and second units being in part reflected from the reflecting surface of the first and second dust protective covering members; and

one or more curvatures formed on the reflecting surfaces of respective first and second dust protective covering members such that the parts of said reflected laser beam flux from the reflecting surfaces of respective first and second dust protective covering members return into the apparatus.

6. The laser line beam emitting apparatus of claim 5, wherein said first dust protective covering member comprises at least a pair of covering elements, the first covering element being arranged on the beam path on which the central optical axis and laser beam flux of the emissive laser beam from said first laser beam emitting unit run, the curvature of said first dust protective covering being formed from said first covering element, the second covering

element being flatten.

7. The laser line beam emitting apparatus of claim 6, wherein said second covering element of the first dust protective covering 5 member also has a curvature formed on its internal surface.

8. The laser line beam emitting apparatus of claim 6, wherein said main covering has hold frames formed at a portion in which said first covering element of the first dust protective covering is 10 opposed to said second covering element of the first dust protective covering at respective ends thereof, for hold thereon of said first and second covering elements of the first dust protective covering.

15 9. The laser line beam emitting apparatus of claim 7, wherein said first and second covering elements of the first dust protective covering are connected with each other at a portion where they are opposed to, and formed integrally with each other.

20 10. The laser line beam emitting apparatus of any of claims 6 to 9, wherein each of said cylindrical rod lenses of respective first and second laser beam emitting units has an outer surface with a curvature, and the curvatures of said first and/or second dust protective coverings are formed in accordance with the curvatures 25 of the external surfaces of respective cylindrical rod lenses, respectively.

11. The laser line beam emitting apparatus of claim 5, wherein

each of said first and/or second dust protective coverings comprises three covering elements, the first covering element having a center portion arranged at an optical path through which the central optical axis of the broadened, emitted laser beam from the first or 5 second laser beam emitting unit passes, and both edges, the second covering element extending from one of said edges to the interior of the apparatus, the third covering element extending from the other of said edges to the interior of the apparatus, said curvatures of the first and/or second dust protective coverings being formed on said 10 first covering elements, respectively.

12. The laser line beam emitting apparatus of claim 11, wherein each of said cylindrical rod lenses of the first and/or second laser beam emitting units has an external surface with a curvature, and 15 at least one of the curvatures of said first, second, and third dust protective coverings is formed in accordance with respective ones of said cylindrical rod lenses of corresponding first and second laser beam emitters.

20 13. A dust protective covering provided in a laser line beam emitting apparatus having a housing; at least a laser beam emitter provided in said housing for emission and broadening of the laser beam flux to any directions in which objects to be emitted reside for draw of a straight reference line thereon, the objects being above, 25 ahead and/or behind of or ahead, opposite sides and/or behind of the apparatus, the reference line being formed by the transverse section of said broadened, emitted laser beam flux; and an outlet provided on said housing for permitting escape of the broadened,

emitted laser beam therefrom, the dust protective covering being provided in said outlet so as to protect the apparatus from dust, said dust protective covering comprising an inner surface opposite to said laser beam emitter, an outer surface opposite to said objects, 5 and a curvature formed on said inner surface thereof so that said reflected, broadened laser beam flux therefrom in part return to the inside of the apparatus.

14. The laser line beam emitting apparatus of claim 13, wherein
10 said laser beam emitter has a cylindrical rod lens provided therein, wherein said cylindrical rod lenses of the laser beam emitter has an outer surface with curvature, and wherein said curvatures of the first and/or second dust protective coverings are formed in accordance with ones of said cylindrical rod lens.

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